# Vegetative propagation in *Spatoglossum pacificum* YENDO (Dictyotaceae, Phaeophyta) from the Oki Islands*

by
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## Abstruct

Results of the present writer's observations on vegetative propagation occurred in nature in *Spatoglossum pacificum* YENDO are presented in this report.

Initial cells of gemmae were formed, uniquely to this species in Dictyotaceae, not only from the blade of sporelings but also from the secondary rhizoid developed from the sporeling. Sporelings were numerously produced on the extensive surface of blades of host thalli in early June. Juvenile gemmae were uniserial, cylindrical and underwent the apical growth. More developed gemmae were monostromatic, spatulate, broader blades by replacing the apical cell to a marginal meristem. The gemmae increased in length, width, thickness, and produced tertiary rhizoids as they further developed. Some gemmae were formed also from the secondary rhizoids of sporelings.

*Key Index Words: Dictyotaceae—the Oki Islands—Phaeophyta*—Spatoglossum pacificum—*vegetative propagation.*

## I. Introduction

Vegetative propagation has been little known in *Spatoglossum pacificum* YENDO[10),12)] so far. The present writer, however, could observe details of the unique vegetative propagation occurred in nature in this species from the Oki Islands in the Sea of Japan this time. A comparison of it and 12 other species of Dictyotaceae[1),3)-6),8),9),11)] on the position of vegetative propagation is also made herein.

## II. Materials and Methods

Materials were collected from rocky bottom at 1m depth in Tsuma Bay, the Oki Islands, Shimane Prefecture on February 2 and June 8, 1994. All of the material plants collected on

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February 2 were morphologically examined just after the collection, but those plants collected on June 8 were kept in 8 *l* plastic seawater tank at 19 °C (corresponding to the mean surface water temperature in the vicinity of the Oki Islands in June according to the Japan Oceanographic Data Center 1973)[2] and under 12:$\overline{12}$ h photoregimes with 600 lux cool white fluorescent illumination for observations in subsequent one more day. Sections were made by hand for the morphological examination.

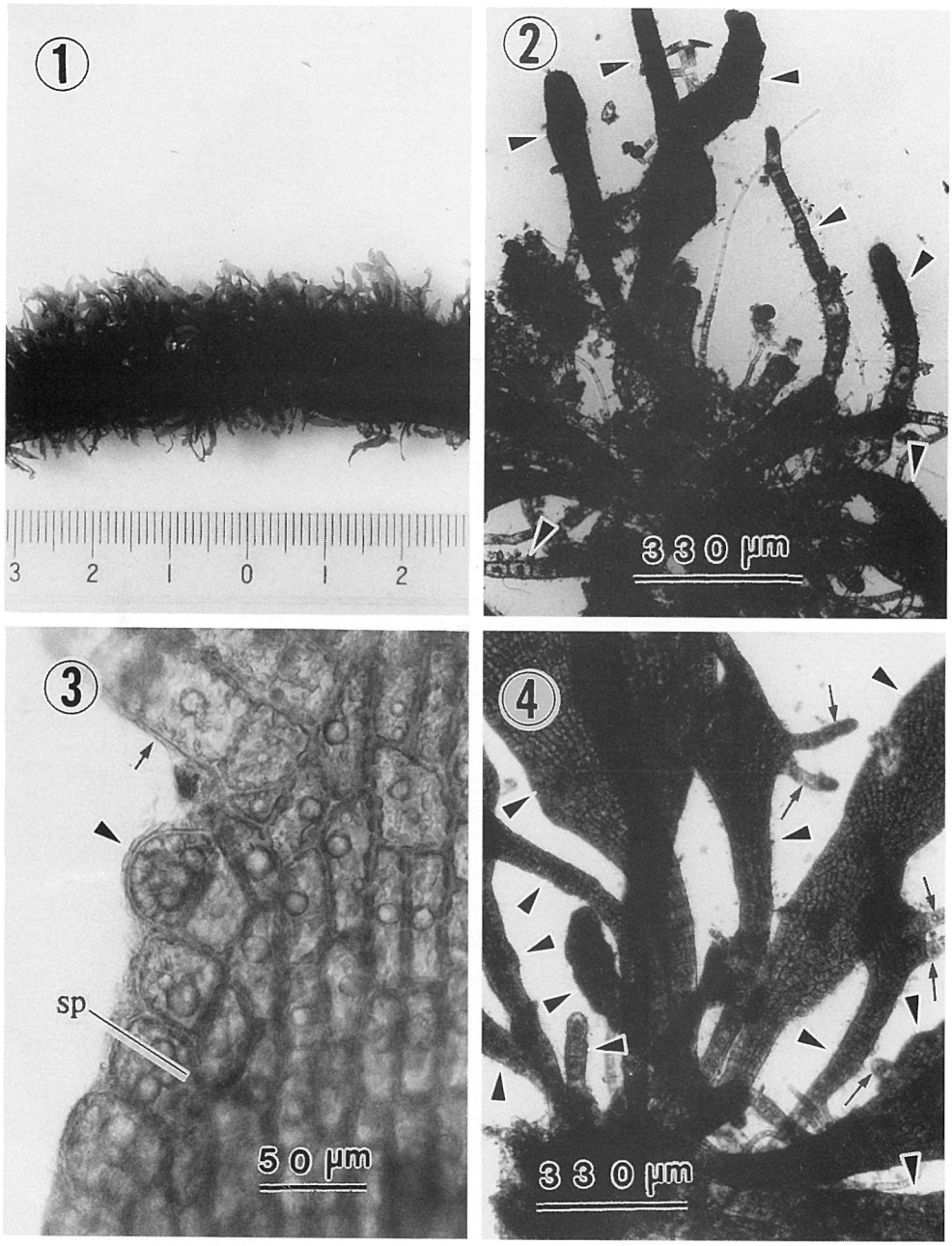
## III. Observations

All of the plants collected on February 2 were sterile and no vegetative propagation was detected in them. All the thalli collected on June 8, however, were sporic and extensively bearing numerous sporelings on the blade surface (Fig. 1), but no evidence of vegetative propagation was detected occurring from tissues of the host thalli. The sporelings were at various stages of development, attaining 8 mm and 1 mm in length and width respectively (Fig. 2). Developing sporelings were monostromatic, undergoing meristematic growth, bearing the secondary rhizoids, and frequently decomposed or damaged by possible graze in the upper portion.

A few to some dome-shaped initial cells of gemmae (Fig. 3) of *c.* 25 $\mu$m in diameter were commonly formed from margin and surface of the sporeling. Juvenile gemmae were uniserial, cylindrical and underwent the apical growth with a dome-shaped apical cell (Figs. 5, 7). More developed gemmae were monostromatic, spatulate, broader blades by replacing the apical cell to a marginal meristem occupying the distal edge (Figs. 6–9). Almost semicircular distal edge of the monostromatic, spatulate to lanceolate developing gemma was occupied by an extensive series of brick-shaped meristematic cells (Fig. 11). The meristematic cells elongated perpendicularly to the distal margin of the developing gemma and divided repeatedly periclinally and anticlinally, consequently the gemma increased in the length, width, thickness as well as in the total cell number (Fig. 10). Most cells of the developing gemma were quadrilateral to hexagonal in surface view (Fig. 12). The gemma produced the tertiary rhizoids (Figs. 10, 13) as they developed. Some gemmae were formed also from the secondary rhizoids, terminally or leterally, which were produced from the developing sporelings (Fig. 14).

## IV. Discussion

KUMAGAE[7] reported, in *S. pacificum* from Shigashima in Fukuoka Prefecture, an evidence of initiation of gemmae from the secondary rhizoid developed from the cultured sporeling without illustration in 1972, but he was unable to observe further development of gemmae. No additional report has been published on the vegetative propagation for this species so far.



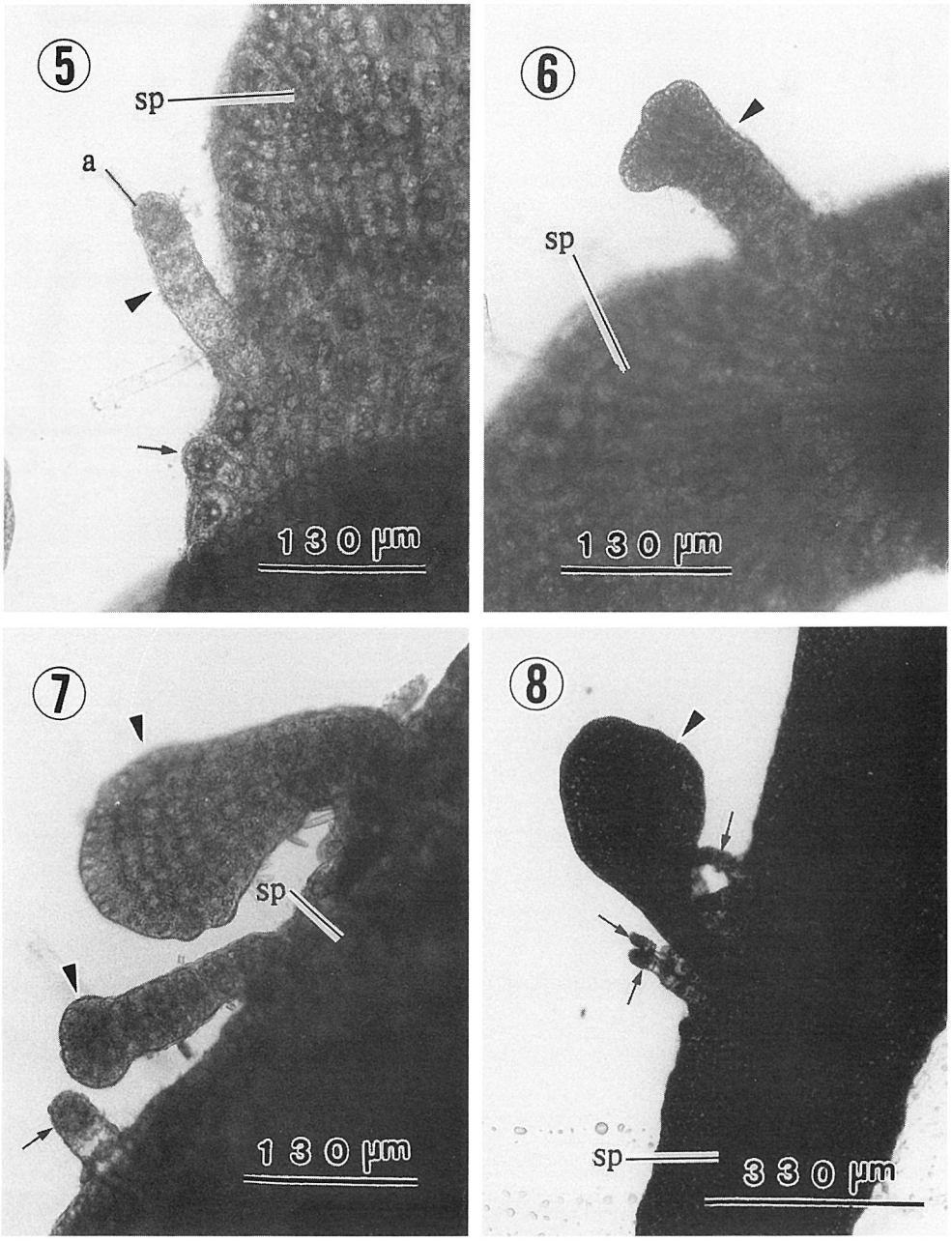

Figs. 1–4. *Spatoglossum pacificum* YENDO.

Fig. 1. Part of a mature thallus showing numerous sporelings covering frond surfaces extensively.

Fig. 2. Some young sporelings (arrowheads) isolated from the host blade.

Fig. 3. Part of a sporeling (sp) showing an initial cell of the gemma (arrowhead) and a uniserial juvenile gemma (arrow) arising from the margin.

Fig. 4. Some developing sporelings (arrowheads) isolated from the host blade, showing five uniserial juvenile gemmae (arrows).



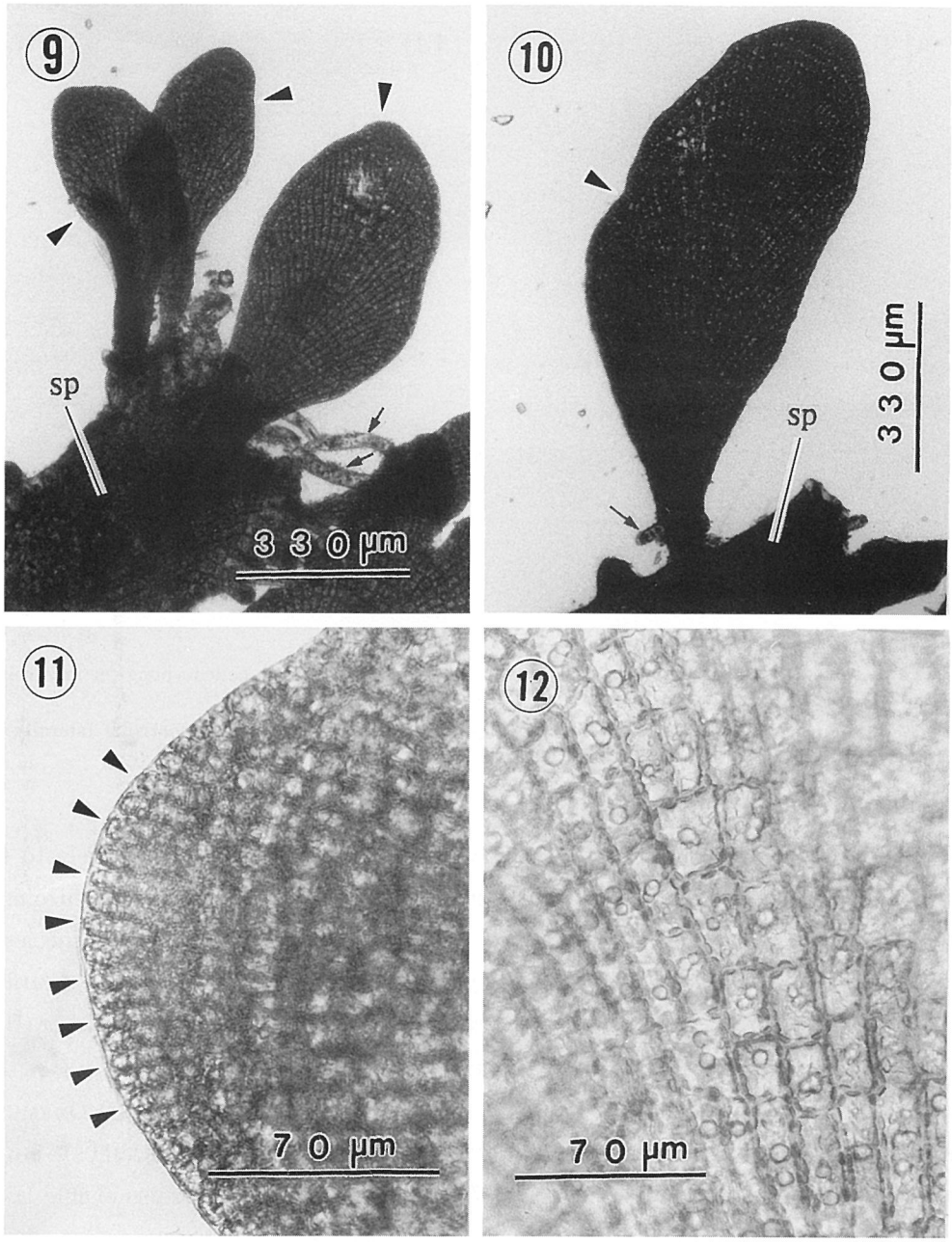

Figs. 5−8. *Spatoglossum pacificum* YENDO.

Fig. 5. Part of a sporeling (sp) showing an initial cell of the gemma (arrow) and a cylindrical, uniserial juvenile gemma (arrowhead) with an apical cell (a) and arising from the margin.

Fig. 6. Part of a sporeling (sp) showing a spatulate young gemma (arrowhead) with a marginal meristem and arising from the margin.

Fig. 7. Part of a sporeling (sp) showing a two-celled uniserial juvenile gemma (arrow) and two spatulate young gemmae (arrowheads) with a terminal meristem and arising from the margin.

Fig. 8. Part of a sporeling (sp) showing a developing gemma (arrowhead) and three secondary rhizoids arising from the lower margin.



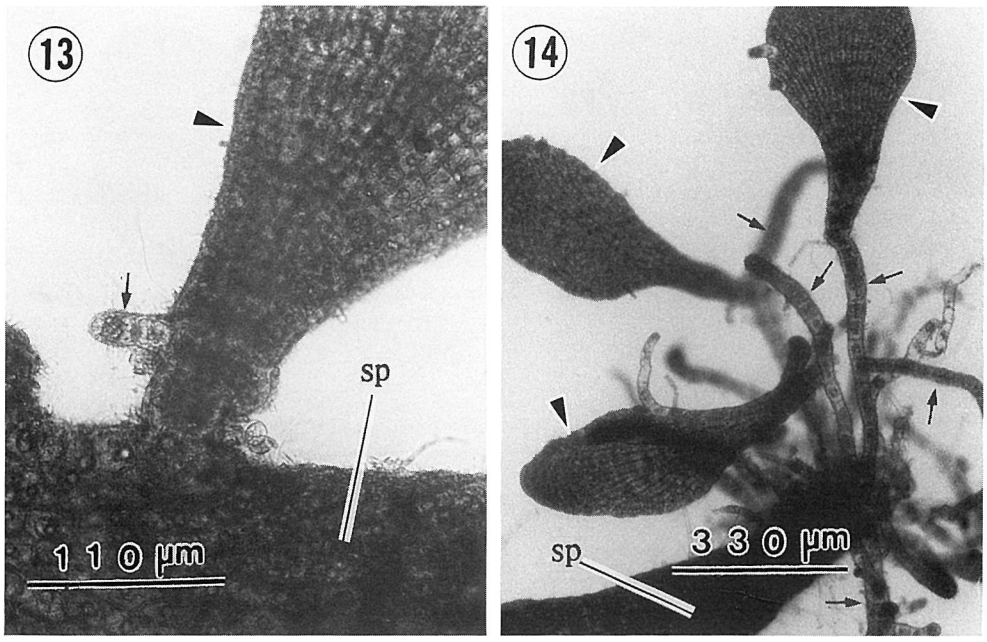

Figs. 9–12. *Spatoglossum pacificum* YENDO.

Fig. 9. Part of a sporeling (sp) showing three developing gemmae (arrowheads) and two secondary rhizoids (arrows) arising from a portion damaged by possible graze.

Fig. 10. Part of a sporeling (sp) damaged by possible graze, showing a developing sporeling (arrowhead) with a young tertiary rhizoid (arrow) near the base and arising from the margin.

Fig. 11. Terminal portion of the gemma in Fig. 10 showing some meristematic cells (arrowheads).

Fig. 12. Middle portion of the gemma in Fig. 10 showing the shape and arrangement of cells in surface view.




Figs. 13, 14. *Spatoglossum pacificum* YENDO.
Fig. 13. Lower part of the gemma in Fig. 10 (arrowhead) showing a two-celled young tertiary rhizoid (arrow).
Fig. 14. Part of a sporeling (sp) showing three developing gemmae (arrowheads) arising laterally and terminally from the secondary rhizoids (arrows).

Vegetative propagation in *S. pacificum* from the Oki Islands occurred, uniquely to this species in Dictyotaceae, from blades of sporelings as well as from the secondary rhizoids as mentioned above. Therefore, *S. pacificum* is commonly distinct from those 12 species of Dictyotaceae in the position of vegetative propagation, such as *Dictyopteris divaricata* (OKAMURA) OKAMURA, *Dictyopteris prolifera* (OKAMURA) OKAMURA, *Dictyota dichotoma* (HUDSON) LAMOUROUX, *Dictyota linearis* (C. AGARDH) GREVILLE, *Dilophus okamurae* DAWSON, *Distromium decumbens* (OKAMURA) LEVRING, *Pachydictyon coriaceum* (HOLMES) OKAMURA, *Padina crassa* YAMADA, *Padina japonica* YAMADA, *Padina pavonica* (LINNAEUS) THIVY, *Zonaria diesingiana* J. AGARDH and *Zonaria flabellata* (OKAMURA) PAPENFUSS (Table 1).

## V. Acknowledgement

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Table 1. Comparison of dictyotaceous species on the position of vegetative propagation.

| Species | Position | Reference |
|---|---|---|
| *Spatoglossum pacificum* | On blades and rhizoids of sporelings | KUMAGAE, 1972; present study |
| *Padina japonica* | On rhizomes | KAJIMURA, in press |
| *Dictyopteris prolifera* | On rhizoids | KAJIMURA, in press |
| *Dictyota linearis* | On blades | KAJIMURA, in press |
| *Padina crassa* | On rhizoids | KAJIMURA, 1993 |
| *Dilophus okamurae* | On blades | KAJIMURA, 1992 |
| *Zonaria flabellata* | On rhizoids | KAJIMURA, 1992 |
| *Distromium decumbens* | On blades and rhizoids | KAJIMURA, 1986 |
| *Pachydictyon coriaceum* | On blades | KUMAGAE, 1977 |
| *Dictyota dichotoma* | On blades | HOYT, 1907 |
| *Dictyopteris divaricata* | On rhizoids | TOKIDA, *et al.*, 1953 |
| *Zonaria diesingiana* | On blades and rhizoids | KUMAGAE, 1977 |
| *Padina pavonica* | On rhizomes | REINKE, 1878 |

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